In the Claims:

1. (Currently amended) A method of estimating characteristics of a plasma contained in a reaction chamber of a plasma reactor including a plurality of magnets that move with respect to the reaction chamber, the method comprising:

obtaining configuration and process condition data for the reaction chamber, the data comprising a 3-dimensional distribution of a static electromagnetic field induced by the plurality of magnets in the reaction chamber;

computing plasma characteristics for each of a plurality of cross-sections of the reaction chamber from the data, the plurality of cross-sections being selected from the 3-dimensional distribution of the static electromagnetic field; and

generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections to estimate the plasma characteristics,

wherein the plurality of moving magnets rotate about an axis of rotation that lies in a plurality of planes corresponding to ~~, and wherein~~ each of the plurality of cross-sections ~~includes the axis of rotation~~.

2. (Canceled)

3. (Previously presented) A method according to Claim 1, wherein computing plasma characteristics for each of a plurality of cross-sections in the reaction chamber comprises performing the following actions for each of the cross-sections:

computing electron density and temperature for the cross-section using an iterative Monte Carlo computational procedure; and

computing ion and neutral species transmission phenomena for the cross-section from a plasma dynamics simulation.

4. (Original) A method according to Claim 3, wherein computing the ion and neutral species transmission phenomena for the cross-section from a plasma dynamics simulation comprises computing solutions to a continuity equation and Poisson's equation for the ion and neutral species.

5. (Previously presented) A method according to Claim 3, wherein computing plasma characteristics for each of a plurality of cross-sections in the reaction chamber comprises computing the plasma characteristics for each of the plurality of cross-sections from at least one of a plurality of determined static magnetic field directions, shape information for the reaction chamber, and plasma collision reaction data.

6. (Original) A method according to Claim 1, wherein generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections comprises computing at least one of an electron density distribution, a temperature distribution, a distribution of ion species, a distribution of neutral species, and a flux incidence.

7. (Original) A method according to Claim 1, wherein generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections comprises averaging the computed plasma characteristics for each of the plurality of cross-sections.

8. (Original) A method according to Claim 1, further comprising estimating an etching rate for a wafer positioned in the chamber from the generalized model of the plasma.

9. (Original) A method according to Claim 1, wherein the plasma reactor comprises a dipole ring magnet (DRM) plasma reactor.

10. (Currently amended) An apparatus for estimating characteristics of a plasma contained in a reaction chamber of a plasma reactor including a plurality of magnets that move with respect to the reaction chamber, the apparatus comprising:

means for obtaining configuration and process condition data for the reaction chamber, the data comprising a 3-dimensional distribution of a static electromagnetic field induced by the plurality of magnets in the reaction chamber;

means for computing plasma characteristics for each of a plurality of cross-sections of the reaction chamber from the data, the plurality of cross-sections being selected from the 3-dimensional distribution of the static electromagnetic field; and

means for generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections to estimate plasma characteristics,

wherein the plurality of moving magnets rotate about an axis of rotation that lies in a plurality of planes corresponding to~~, and wherein~~ each of the plurality of cross-sections ~~includes the axis of rotation~~.

11. (Canceled)

12. (Previously presented) An apparatus according to Claim 10, wherein the means for computing plasma characteristics for each of a plurality of cross-sections in the reaction chamber comprises:

means for computing electron density and temperature for a cross-section using an iterative Monte Carlo computational procedure; and

means for computing ion and neutral species transmission phenomena for the cross-section from a plasma dynamics simulation.

13. (Original) An apparatus according to Claim 12, wherein the means for computing the ion and neutral species transmission phenomena for the cross-section from a plasma dynamics simulation comprises means for computing solutions to a continuity equation and Poisson's equation for the ion and neutral species.

14. (Previously presented) An apparatus according to Claim 12, wherein computing plasma characteristics for each of a plurality of cross-sections in the reaction chamber comprises computing the plasma characteristics for each of the plurality of cross-sections from at least one of a plurality of determined static magnetic field directions, shape information for the reaction chamber, and plasma collision reaction data.

15. (Original) An apparatus according to Claim 10, wherein the means for generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections comprises means for computing at least one of an electron density distribution, a temperature distribution, a distribution of ion species, a distribution of neutral species, and a flux incidence.

16. (Original) An apparatus according to Claim 10, wherein the means for generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections comprises means for averaging the computed plasma characteristics for each of the plurality of cross-sections.

17. (Original) An apparatus according to Claim 10, further comprising means for estimating an etching rate for a wafer positioned in the chamber from the generalized model of the plasma.

18. (Original) An apparatus according to Claim 10, wherein the plasma reactor comprises a dipole ring magnet (DRM) plasma reactor.

19. (Currently amended) A computer program product for estimating characteristics of a plasma contained in a reaction chamber of a plasma reactor including a plurality of magnets that move with respect to the reaction chamber, the computer program product comprising program code embodied in a computer-readable storage medium, the program code comprising instructions for:

obtaining configuration and process data for the reaction chamber, the data comprising a 3-dimensional distribution of a static electromagnetic field induced by the plurality of magnets in the reaction chamber;

computing plasma characteristics for each of a plurality of cross-sections in the reaction chamber from the data, the plurality of cross-sections being selected from the 3-dimensional distribution of the static electromagnetic field; and

generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections to estimate plasma characteristics,

wherein the plurality of moving magnets rotate about an axis of rotation that lies in a plurality of planes corresponding to~~, and wherein~~ each of the plurality of cross-sections ~~includes the axis of rotation~~.

20. (Canceled)

21. (Previously presented) A computer program product according to Claim 19, wherein the program code for computing plasma characteristics for each in a plurality of cross-sections of the reaction chamber comprises instructions for:

computing electron density and temperature for a cross-section using an iterative Monte Carlo computational procedure; and

computing ion and neutral species transmission phenomena for the cross-section from a plasma dynamics simulation.

22. (Previously presented) A computer program product according to Claim 21, wherein the program code for computing the ion and neutral species transmission phenomena for the cross-section from a plasma dynamics simulation comprises instructions for computing solutions to a continuity equation and Poisson's equation for the ion and neutral species.

23. (Previously presented) A computer program product according to Claim 21, wherein the program code for computing plasma characteristics for each of a plurality of cross-sections in the reaction chamber comprises instructions for computing the plasma characteristics for each of the plurality of cross-sections from at least one of a plurality of determined static magnetic field directions, shape information for the reaction chamber, and plasma collision reaction data.

24. (Previously presented) A computer program product according to Claim 19, wherein the program code for generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections comprises instructions for

computing at least one of an electron density distribution, a temperature distribution, a distribution of ion species, a distribution of neutral species, and a flux incidence.

25. (Previously presented) A computer program product according to Claim 19, wherein the program code for generating a generalized model of the plasma from the computed plasma characteristics for the plurality of cross-sections comprises instructions for averaging the computed plasma characteristics for each of the plurality of cross-sections.

26. (Previously presented) A computer program product according to Claim 19, further comprising instructions for estimating an etching rate for a wafer positioned in the chamber from the generalized model of the plasma.

27. (Original) A computer program product according to Claim 19, wherein the plasma reactor comprises a dipole ring magnet (DRM) plasma reactor.

28. (Currently amended) A method of simulating plasma in a plasma apparatus having a plasma reactor and a plurality of permanent magnets which are asymmetrically arranged and rotate around the plasma reactor at predetermined speed, comprising the steps of:

(a) inputting a plasma reactor shape and process conditions and inputting plasma collision reaction data;

(b) 3-dimensionally computing static magnetic fields induced by the permanent magnets;

(c) computing electron density and temperature by a Monte Carlo method and interpreting the transmission phenomenon of ion and neutral species using the data of the steps (a) and (b) until they are converged;

(d) obtaining overall plasma characteristics using the converged values to simulate plasma characteristics; and

wherein the step(c) comprises plasma simulation by 2-dimensional cross-sections for a 3-dimensional distribution of a static electromagnetic field in a characteristic magnetic field

direction, and wherein the 2-dimensional plasma simulation is performed for a plurality of 2-dimensional eross-seetions including an axis that lies in a plurality of planes corresponding to the plurality of 2-dimensional eross-seetions.

29. (Caneeled)

30. (Previously presented) The method of claim 28, wherein the plasma simulation obtains eonvergence values for the respective eross-seetions and averages them to obtain plasma eharacteristies.

31. (Original) The method of elaim 28, wherein the plasma apparatus is a DRM plasma apparatus.

32. (Currently amended) Computer readable recording media configured to support simulation of plasma in a plasma apparatus having a plasma reactor and a plurality of permanent magnets whieh are asymmetrieally arranged and rotate around the plasma reactor at a predetermined speed, the eomputer readable recording medium eonfigured to inelude a plurality of program modules comprising:

(a) a program module for inputting the plasma reaetor shape and process conditions;

(b) a program module for inputting plasma eollision reaction data;

(c) a program module for computing a 3-dimensional distribution of a static electromagnetic field indueed by the permanent magnets;

(d) a program module for ealculating electron density and temperature by a Monte Carlo method and interpreting the transmission phenomenon of ion and neutral species until they are eonverged to simulate plasma characteristics; and

wherein the program module (d) is configured to perform plasma simulation by 2-dimensional cross-sections for the 3-dimensional distribution of the static electromagnetie field in a eharacteristic magnetic field direction, and wherein the 2-dimensional plasma simulation is performed for a plurality of 2-dimensional cross-seetions ineluding an axis of

rotation of the permanent magnets that lies in a plurality of planes corresponding to the plurality of 2-dimensional cross-seetions.

33. (Caneeled)

34. (Previously presented) The computer readable reeording media of elaim 32, wherein the plasma simulation obtains convergence values for the respective cross-sections and averages them to obtain plasma characteristies.

35. (Original) The computer readable reeording media of elaim 32, wherein the plasma apparatus is a DRM plasma apparatus.